

Assessment of Household Food Security and Coping Strategies in Wolaita Zone: The Case of Sodo Zuria Woreda

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Abstract

This study attempts to assess household food security and local coping strategies of rural farm households in Sodo Zuria Woreda, Wolaita Zone. Data were collected from 150 sample farm households from six peasant administration (PAs) using systematic random sampling techniques. Primary data were collected by conducting a household survey. In addition, focus group discussions and key informant interviews were used. Secondary data were collected from various sources. The data were analyzed using descriptive statistics such as mean, minimum and maximum, standard deviation, percentage and frequency distribution. Moreover, T-test and chi-square tests were used to describe characteristic of food secure and insecure households. In general Sodo Zuria Woreda, suffer from chronic food insecurity. From the total sample households about 72 % are food insecure while the rest 28% are food secure. More than 80% of the respondents face serious food shortage for six to eight months a year. The result revealed that factors associated with size of farm land, number of livestock and draught oxen, off-farm and non-farm incomes, dependency ratio, educational level of household head, and uses of agricultural inputs are significantly related to household food security. Copings strategies including reducing size and number of meals, borrowing grains or cash from relatives and friends, engaging in daily labor, sale of livestock and household equipment, begging, withdrawing children from school and seasonal migration were found to be common practices prevailed in the region. Thus, Distribution of moisture stress tolerant crop varieties and improved technologies that increase the productivity of land and livestock should be given higher priority to enhance sustainable food security in the region. It is also crucial to promote intensive agriculture and non-farm activities, as well as strengthening credit institutions to boost agricultural production and income, and thereby attain improved food security.

Keywords: Food security, food insecurity, livelihood, coping mechanism

1. Introduction

Ethiopia is one of the most food insecure countries with high population growth rate. High dependency ratio and unemployment rates have remained to be a serious problem in securing yearly consumption requirement of the population (MOARD, 2009). According to United States Agency for International Development, an approximate number of 31 million people are food insecure (USAID, 2003). This problem is frequently aggravated by the recurrent drought that threatens the lives of many people who are already food insecure and vulnerable to disasters. Wolaita zone represents one of the major food deficit and famine-prone part of Ethiopia (Ayele Tessema, 2008). The 1999 multi-agency post-Meher harvest assessment findings indicated that the area was categorized as the worst affected zones from SNNPR, needing immediate attention (Vander Veen, 2000). The SNNPR livelihood profile 2005 shows that Wolaita Zone is characterized by chronic poverty and food insecurity. Soddo Zuria is one of the 13 *Woredas* in Wolaita zone. Famine and drought are common problem in the *woreda*. As a consequence, the *woreda* receives handouts in the form of emergency food aid. It is also supported by the government through Poverty Reduction Programmes such as safety net and other package programmes. Other local and international NGO also provide food for households identified as food insecure. According to *woreda* agricultural office, it is reported that about 28,141 households have benefited from safety net program (SZWAO, 2002).

The problem of food insecurity is diverse and has multiple dimensions. It ranges from the global and regional levels to household and individual levels. However, more attention is given to the problem of food security at a country level with little focus on household food security. Research on household food security and local responses has not adequately undertaken in the study area. An assessment of food security at household level is important to supplement nation-wide studies and design appropriate strategies across the different socio economic settings. Thus, this study is believed to contribute to this end and alleviate the current food insecurity situation in the region. There for the main objective of this study is to assess food security situation and Coping strategies of households in Soddo Zuriya Woreda, with specific objectives of: i) To assess the food security status of the households in the study area ii) Assessing association of demographic and socio economic factors with household food security; and iii) Identifying the coping strategies of households in the study area

2. Statement of the problem

Ethiopia lies within one of the most food insecure regions in the world, with a large number of its population living at subsistence levels and dependent on farm production which is highly vulnerable to severe droughts for several times over the past 30 years (Resal Ethiopia, 2001). Food insecurity is one of the defining features of rural poverty

affecting millions of people. About 52 percent of the country's population is food insecure with average consumption of approximately 1770 kilocalories per capita, which is lower than the FAO/WHO recommended rate (2100 kilocalories per person per a day) (FAO, 1998).

Food security and poverty reduction has remained as a top issue and priority agenda as far as rural development is concerned. Many governmental and non-governmental organizations are currently working in this area to ensure sustainable food security at all levels. However, the analysis of factors affecting food security and the level of coping strategy by the households remain a long-standing challenge. Thus, assessing household food security and its association with different demographic and socio economic factors is the main drive of this study to guide policy decisions, devise appropriate interventions and integrated efforts to combat food insecurity.

Hence, this research has been conducted to assess household food security and coping strategies in Soddo Zuriya Woreda, Wolaita zone, Ethiopia.

3. METHODOLOGY

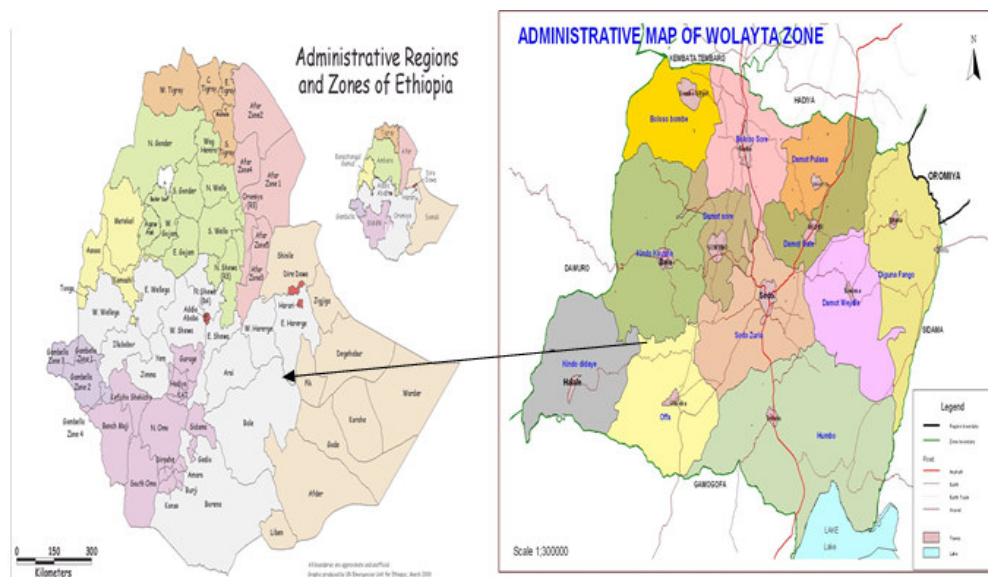
3.1 Description of the study area

Location and topography

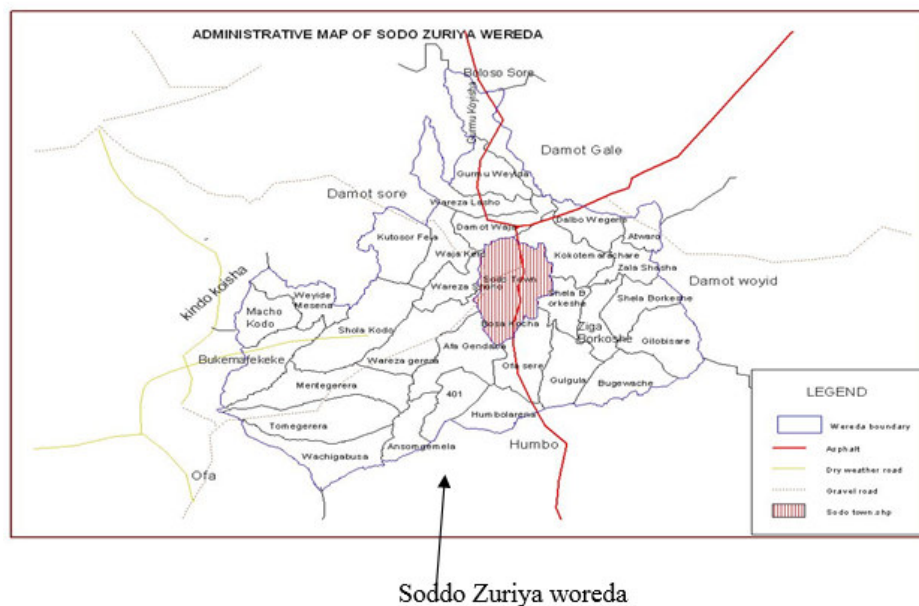
Soddo zuria Woreda is one of rural Woreda administration in Wolaita zone (Southern Nations Nationalities Peoples' Region). The Woreda is located at a distance of 390 km (to the south) from Addis Ababa.

The Woreda has 31 rural Kebele administrative. The total land coverage of the woreda was 40805 hectares, of which 12269 Ha (35.75%) is allocated for crop production, 9067 Ha (19%) for fallow land while 12019 Ha (30.61%) for grazing land and 7450 Ha (15.02%) for forest land (WLUM 2002).

The agro-ecology of the Woreda is dominated by midland that covers about 87% of the total area, and the remaining 13% is highland with rugged mountains and slopes (WFEDO 2005). Damota Mountain is the highest peak (over 2800 m.a.s.l) in the Woreda and is considered as the main water source to the surrounding communities. All the highland Kebeles are located around the mountain. The altitude of the Woreda falls in the range of 1500 to 3200 m.a.s.l. The average annual rainfall of the Woreda is 1200 mm per annum, while the daily temperature varies from 150C to 300C. Soil types on the area are mostly clay and clay loam.



Study area



Source; (WZFED, 2002)

Figure 1: Map of study area

The total population of the *Woreda* is 163,771 out of which 80,525 male and 83246 female (CSA 2008). The population density in the *Woreda* is 490 persons per square kilometer (WZFEDO, 2002). Majority of the population resides in the rural areas and their livelihood mainly depends on subsistence agriculture.

There are two agricultural production seasons; *meher* (long rainy season) and *belg* (short rainy season). The *meher* rains start in June and extends up to mid September, while the *belg* rainy season lasts from March to May. The *belg* season contributes the highest share to the annual crop production, and about 87% of the farmers operate in this season.

Agriculture is the main source of livelihoods of the people. However, the agricultural system is still traditional and is often characterized by low productivity. Farmers grow a variety of crops in the two seasons. Maize is the major food crop grown by all farmers as a main source for own consumption as well as for market. Haricot bean is often intercropped within maize field for own consumption and cash in the midland, while wheat and barely are the major crops grown in the highland area.

Irish and sweet potato, enset /false banana/, cassava, taro and other root crops are also grown. Root crops play an important role in filling the gap in household food requirement particularly during the lean season. Agricultural and Rural development office reports show that the total livestock population of the *woreda* estimated to be 295, 687. The major livestock manage in the study area include caws, Oxen, sheep and goat, donkey and poultry. Mule and horses found in small number.

Non-farm activities are the most important source of income for livelihood in the *Woreda*. Some *kebeles* in the study area are nearer to most of small towns where farmers can engage in some sort of income generating activities such as petty trading and sale of labor.

There are 7 health centers and 39 health posts and 1 NGO clinic in the *woreda*. Water supply covers about 57% of the *woreda*. The *Woreda* has 42 first cycles (grade 1-4), 31 second cycles (grade 5-8) primary schools, two secondary schools (grade 9-10).

Sodo town and one rural *Kebele* which is *bossa kacha* obtain hydro electric powers. All *kebeles* have wireless telecommunication. There are markets (both output and input markets) in all *kebeles*.

3.2 Research design and sampling techniques

Two stage sampling technique was employed. In the first stage, six *kebeles* were selected purposively in consideration of the size of people, mostly affected by food insecurity and the number of the beneficiary of safety net programme and food aid.

In the second stage a total of 150 respondents were selected from the six *kebeles* using systematic random sampling techniques. The number of sample household chosen from each *kebele* was proportional based on the total number of households in each *kebele*

Table 1: Sample kebeles and sample size in study area

Code	KA	Number of HHs in sample Kebeles				Sample size**
		M	F	T	%*	
01	Dalbo wegene	635	59	694	13.3	20
02	Bossa kacha	641	121	762	14.7	22
03	Offa sere	837	229	1066	20	30
04	Humbo Larena	467	125	592	11.3	17
05	Waraze Gerera	703	153	856	16.7	25
06	Waraza Lasho	1175	98	1273	24	36
	Total	4458	785	5243	100	150

* Percentage= (Total population in individual KA/Total population of all sample KAs) X 100

**Sample size= (PercentageX150/ 100)

Source: Own survey, 2011

3.3 Data sources and types

Both qualitative and quantitative data were collected from primary and secondary sources to identify major factors affecting food insecurity. The primary data was collected from the sample households using structured questionnaire. Checklists were also developed to collect general information from key informants and focus group discussions. The primary data is supplemented by secondary data that was gathered from published and unpublished documents. Also personal histories of some sample households were also collected.

The main types of data collected for this study include household demographic characteristics, farm and non-farm incomes, livestock and oxen ownership, soil erosion, and types and amount of food used for consumption by the household in a specific period (seven days in this case). In addition data on agricultural input uses, problems in crop and animal production, climate factors (rainfall) and social obligation were also collected. The coping strategy practiced by households during food shortage was also assessed.

3.4 Methods of data collection

Data was collected using structured survey questionnaire from selected households. The questionnaire was pre-tested before the execution of the survey. Based on the result of the pre-tested questionnaire, modification was made on the final version of the interview schedule. To assist in the data collection six enumerators who have completed three years college training were recruited. All are fluent speakers of the local language (wolatigna) and are familiar with the culture of the people. They were trained on the contents of the questionnaire, techniques of data collection and the procedure to approach farmers to conduct the interview and gather information correctly. Information on food consumption patterns and food security status were also collected through the survey. The sample kebeles were Bossa Kacha, Dalbo Wegene, Waraza Lasho, Waraza Gerera, Hombo Larena and Offa Sere. The data were collected by visiting each one of the sample households including personal observations.

Focus group discussions

In addition to the information collected through the individual survey questionnaires and key informant questionnaire; focus group discussions were also used in each of the sample PAs to get the general picture of the PAs regarding the objective of the study. In each FGD, 8 members (old, young, male and female) of the society were selected at each PA. Focus group discussions were carried out separately for men and women. All of them were selected after thorough discussion with other pertinent key informants in the PA particularly with peasant leaders, school teachers and development agents.

Key informants

Checklist was developed for the key informants to obtain some general information on food security situation. The members of key informants were PA administrators, development agents, health extension worker, school principals, elders, influential women, influential youths, agents of active NGOs in the area, and wereda officials.

In addition, secondary data were gathered from research journals, different websites from internet, research reports, development agents in the respective PAs, Agricultural and Rural Development Office in the *woreda*, health office, teaching office and Zonal Agricultural Department.

3.5 Methods of data analysis

After the completion of the household survey, the data were coded and entered in to Statistical Package for Social Science (SPSS). Data regarding the first and the second objectives were analyzed using descriptive statistics. Information generated through key informant interviews and focus group discussions were qualitatively analyzed. The specific methods of data analysis involved tabulation and cross-tabulation, frequencies and percentages, computation of descriptive statistics such as minimum, maximum, mean and standard deviation. Furthermore simple correlation, t-test and chi-square tests were employed to examine the statistical relationship between food

security and demographic and socio-economic factors.

Food security status at household level was measured by using the direct survey of dietary intake. The data obtained from the seven-day recall method of daily consumption record were converted into kilocalorie using the Food Composition Table Manual (EHNRI, 1997).

After that, the converted data were divided into household adult equivalent to evaluate the per capita energy intake. Then after, the results obtained were compared with the minimum subsistence requirement per AE per day (i.e. 2100 kcal). Households who consume equal and above the minimum requirement (2100 kcal per AE per day) were categorized as food secure otherwise food insecure.

4. Result and discussion

There are many factors that affect food security in the study area including lack of oxen, small farm size, low income, high dependency ratio, low educational level of household head, and low level of production. It is also affected by inadequate access to essential inputs, soil infertility and high erosion, as well as prevalence of irregular rain fall. For it is too much to list all mentioned causes in the table, we limited ourselves to the most important ones depending on proportion of responses. The following discussion summarizes food security status of sample households, the extent of relationship of food security with demographic and socio economic factors and coping strategies do households employ during food shortage in the study area.

1. Food Security Status of Sample Households In this study, food security at household level was assessed by direct survey of consumption. Calorie intake per adult equivalent (AE) per day was employed to delineate sample households as food secure and food insecure. Data on food consumption from different sources including own production, purchases and transfers in terms of gifts or wage in kind for the last seven days were collected using recall method. The collected data were further converted into calorie values using Food Composition Table for Ethiopia (EHNRI/FAO, 1998). Following this, the amount of energy in kilocalorie (kcal) available for the household was calculated on a person-day basis. Then, the results were compared with the minimum subsistence requirement per person day; i.e. 2100 kcal. Based on this criterion, households with calorie consumption of less than 2100 Kcal per AE per day were categorized as food insecure and those with the consumption of 2100 Kcal and above were considered as food secure.

23 Among the total sample households, about 42 households (28%) were found to be food secure and the rest 108 households (72%) were food insecure. The minimum and maximum amount of energy for food insecure households is 149 kcal and 2046 kcal, respectively while the minimum and maximum energy intakes of food secure households are 2143Kcal and 5171 Kcal respectively. The total mean energy intake for all sample households was 1690.12 kcal, which is less than the average norm by 20%. Mean energy for food insecure households was about 1238.72 kcal whereas it was about 2850.86 kcal for the food secure households (Table 2). Nearly a quarter of the sample households are in extreme food insecure situation having an energy intake of below 1400 kcal. The t value (15.578) confirmed that there is significant mean difference between food insecure and secure households (Table 1).

Table 1: Energy Available per AE per day

Energy available per AE /Kcal/	Food insecure (N=108)	Food secure (N=42)	Total (N=150)
Minimum	149	2143	149
Maximum	2046	5171	5175
Mean	1238.72	2850.86	1690.12
Standard Deviation	456.18	780.96	919
t- value	15.57***		

***significant at less than 1% probability

Source: Own survey, 2011

2. Household Demographic Characteristics

Demographic characteristics of sample households, which have immediate relation with food security, are discussed. The variables mainly include: age and sex of household head, dependency ratio and household size.

2.1 Age of Household Heads

Age range varies from 20 to 90, with an average of 41.21. Large number of both food secure and food insecure households fall under the age group of 20-50. Nearly 71% of the total households are between the age of 20 and 45 while the age between 46 and 65 makes up about 29%. The t-value in the Table 2 indicates that there is insignificant difference between age of food insecure and food secure households.

Table 2: Age of Household Head by Food Security Status

Age group (in years)	Food insecure (N=108)		Food secure (N=42)		Total (N=150)	
	Number	Percent	Number	Percent	Number	Percent
20-45	73	68.9	33	31.1	106	70.7
46-65	32	84.2	6	15.8	38	25.3
above 65	3	50	3	50	6	4
Minimum	22		20		20	
Maximum	90		85		90	
Mean	41.7		39.95		41.21	
Standard deviation	12.39		14.57		13.02	
t-value			0.739			

Source: Own survey, 2011

2.2 Sex of Household Heads

Sex of household head is an important factor in determining household food security. Table 4 shows that female headed households comprise 32.7% of the total sample households while male headed households form about 67.3%. Female food insecure households make up about 73.5% of the total female headed households while that of male households comprise about 71.5% of the male headed households. The state of food security among the two groups is not that much different contrary to the assertion made by other studies. The Chi-square test indicates that there is no statistical association between food security and sex of household heads. However in the study area Female headed are face a great challenge during cropping season which is labor power. It is a critical problem for those; because of this they give their farm land for share crops or rented out. During women focus group discussion they outshine the above problem mentioned strongly.

Table 3: State of Food Security by Sex Composition

Sex of household heads	Household food security status				Total	
	Food insecure (N=108)	percent	Food secure (N=42)	percent	Number	Percent
Male	72	71.3	29	28.7	101	67.3
Female	36	73.5	13	26.5	49	32.7
Total	108	72	42	28	150	100
Chi-square	0.078					

Source: Own survey, 2011

2.3 Marital Status of the Household Head

From the total respondents, about 63.3 % of the households are married while the remaining 31.3%, 4.7%, and 0.7 % are widowed, single and divorced, respectively (figure 3). From the total married respondents, about four are engaged in polygamous marriage. Most claim that polygamy is practiced in need of children and prestige in the society. Food insecurity in the study area is relatively common among the widowed and married families as these have a significant number of dependent family members. The proportion of food insecure households in the widowed category is found to be about 77% while that of the married family makes up nearly 73% of its category. The association between food security and marital status is statistically significant at a probability level of 10%.

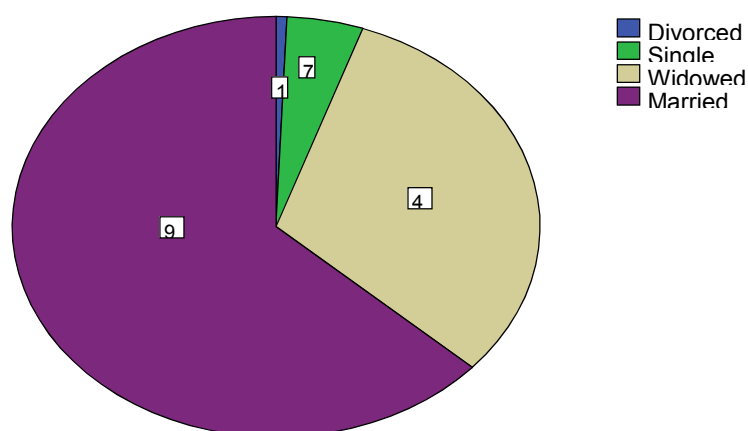


Figure 1:

Marital Status of Sample Household Head

Source: Own survey, 2011

2.4 Dependency Ratio in the Household

Dependant numbers in the household refers to the children under age 15 and old age over 64. Guled (2006) expressed those rural households with large family size, having non-productive age group have highly affected by food insecurity than farm households that have limited number of dependant members. In this study number of dependant members in the household possesses similar distribution for both types of households. As Table 5 shows, the large numbers of food insecure households fall under second category (3-5). The mean difference between the two household categories is about 0.36 and it shows that the number of dependant members in the household has affected the state of household food security. The possible explanation can be those households with many children and old age groups could face food insecurity because of high dependency burden. It is consistent with the expectation that households with high dependency ratio have a role in affecting the probability of households to be food insecure. However in the study area children of 7 years perform labor for their family.

Table 4: Food Security Status by Size of Dependent Members

Number of dependant member	Food insecure(N=108)		Food secured(N=42)		Total(N=150)	
	Number	Percent	Number	Percent	Number	Percent
0-2	50	66.7	25	33.3	75	50
3-5	54	77.1	16	22.9	70	46.7
6-8	3	75	1	25	4	2.7
9-10	1	100	0	0	1	0.7
Minimum	1		1		1	
Maximum	10		6		10	
Mean	2.76		2.19		2.6	
Std.deviation	1.70		1.52		1.66	
t-value	1.897*					

*significant at less than 10% probability level

Source: Own survey, 2011

2.5 Size of Household Member The number of household members in the household is an important factor that determines the state of household food security. In the study area, the average household size was about 5.67 ranging from 1 to 14. This was found to be higher than the regional average which was about 4.9 per family (CSA 2007). The study result shows that the majority of sample households / more than 80%/ have large size /greater than 4/ of family members (Table 6). The mean difference of between food insecure and food secure was 0.76. The study shows that households with large family members are more likely to be affected by food insecurity than those household with low number of household members. The association between food security and size of household members is statistically significant at a probability level of 10%. That means household with low number of member are more likely to be food secure than household with large household member. The personal

history in box 1 shows how large family size affects household food security.

Table 5: Distribution of respondents by Household size and Food security Status

Number of Household Member	Food insecure (N=108)		Food secure (N=42)		Total (N=150)	
	Number	Percent	Number	Percent	Number	Percent
1-3	17	60	11	39.3	28	18.7
4-6	52	71	21	28.8	73	48.7
7-9	34	79	9	20.9	43	28.7
10 and above	5	83.3	1	16.7	6	4
Minimum	2		1		1	
Maximum	14		13		14	
Mean	5.88		5.12		5.67	
Std.deviation	2.249		2.297		2.28	
t-value	1.848*					

Source: Own survey, 2011

3. Socio Economic Factors

3.1 Educational Level of Household heads Education is an important factor that helps farm community to get access to agricultural information. It largely influences the adoption of new technologies and improved techniques of production. The educational level of the respondents ranges from inability to read and write to having attained secondary level of education. In the study area, more than half of the sample households do not have the capacity to read and write, of which 81% is concentrated in food insecure population. This indicates that households with relatively low level of education are more likely to be food insecure than those households with better education level. The latter types of households are often well informed and have good access to media, new skills and improved technologies. The chi -square value (10.59) for this variable indicates that there is significant relationship between educational level of the household head and food security. That means relatively better educated household head are more likely to be food secure than low level education.

Table 6: Educational Level of Household Head

Educational level of household head	Food insecure (N=108)		Food secure (N=42)		Total	
	Number	Percent	Number	Percent	Number	Percent
Not able to read and write	63	81.8	14	18.2	77	51.3
Primary education	39	66.1	20	33.9	59	39.3
Secondary education	6	42.9	8	57.1	14	9.3
Chi-square value	10.59**					

**significant at less than 5% probability

Source: Own survey, 2011

3.2 Farm Size Farm land is the most important factor that determines the state of household food security. Land holding plays a significant role in influencing farm household food security (Tefaye k. 2002, and Degefa 2002). As illustrated in Table 8, the land holding size of sample households ranges from 0.03 to 1.0 hectare, with a mean size of 0.29. Cultivated land in the study area is one of the scarce resources that limit agricultural development. During the focus group discussions in both sample PAs, it was noted that the study area is characterized by very small and highly fragmented landholdings because of higher density of population. Landholdings continually decrease both in size and quality due to redistribution among family members and continuous cultivation which in turn leads to soil nutrient depletions and erosion. Children share the holdings of their families as they get to adulthood; otherwise they migrate out to other areas. Therefore, average land holding sizes have been steadily going down. All the Woreda Office of Agriculture estimates the average landholdings of Soddo Zuria Woreda to be 0.25 ha. The survey result shows that the majority of the sample households (72%) have < 0.5 ha of farm land (Table 8). There is statistically significant difference in cultivated land between the two groups, food secure and food insecure, at a probability level of 1%. The personal history in box 2 shows scarcity of farm land affects the household food security.

Table 7: Distribution of Households by Size of Farm land

Total cultivated land size in ha	Food insecure (N=108)		Food secure (N= 42)		Total (N=150)	
	Number	Percent	Number	Percent	Number	Percent
> 0.5	80	74	28	25	108	72
0.5-1.0	28	71.8	11	28.2	39	26
1 - 2	0		3	100	3	2
Minimum	0.03		0.062		0.03	
Maximum	0.75		1		1	
Mean	0.28		0.33		0.29	
Std.deviation	0.17		0.26		0.2	
t-value	7.758***					

*** Significant at less than 1% probability

Source: Own survey, 2011

3.3. Livestock owned in Tropical Livestock Unit (TLU) Livestock is important source of livelihood in the study area. It contributes as source of transport, nutrition, and income. It also serves as a means of coping mechanism during shortage of food. The types of animal reared in the study area include cattle, sheep, goat, donkey and chicken. The mean size of livestock holding is about 1.94 TLU varying from 0 to the maximum of 7.25 TLU. Livestock is mainly constrained by lack of grazing land and feed, as well as by the prevalence of many diseases. Among the total sample households, about 38% possess 0-1 TLU while 42% have between 1 and 3 TLU. Livestock holding was relatively concentrated in food secure category of sample households. The mean holding for food insecure and secure households was found to be 1.68 TLU and 2.64 TLU, respectively. The mean difference between food secure and insecure households is 0.96 TLU. The difference among the two social groups is statistically significant at a probability level of 1%.

Table 8: Livestock Distribution for Sample Household (in TLU)

Livestock owned (in TLU)	Food insecure (N=108)		Food secure (N=42)		Total(N=150)	
	Number	Percent	Number	Percent	Number	Percent
0-1	43	75.4	14	24.6	57	38
1.01 - 3	51	81.0	12	19.0	63	42
3.01 - 5	14	53.8	12	46.2	26	17.3
5.01 - 7	0	0.0	3	100	3	2
>7	0	0.0	1	100	1	0.7
Minimum	0.065		0.388		0.065	
Maximum	4.682		7.25		7.25	
Mean	1.68		2.64		1.94	
Std.deviation	1.11		1.74		1.38	
t-value	3.82***					

*** Significant at less than 1% probability

Source: Own survey, 2011

3.4 Oxen Ownership Oxen power, among others, is an important and critical production factor in the rural center. Availability of oxen, besides agricultural land, is a limiting factor to boost food production and meet household food requirement. As Table 10 shows, about 77.8% of the total households with no oxen are food insecure while 22% are food secure. In most cases, these farm households are forced to rent-out their plots of land to others or rent-in oxen from others, but only after the owners have completed plowing their own plots. However the plowing season might have passed or got late. During group discussion and individual interviews the lack of oxen was reported as the single most important problem impacting on agricultural production in the study area. As the survey result indicates, food insecure households possess below one ox while most in food secure group have more than one ox. This result is similar to Kidane *et al* (2005), substantiating that the numbers of oxen in food secure households is relatively higher than that of food insecure. The t-test value also showed that there is significant difference in oxen ownership among food secure and food insecure households. It indicates that oxen ownership has strong association to food security. Personal history in box 3 shows that the absence of oxen owner ship affects household food security.

Table 9: Number of Oxen owned by Household

Oxen ownership number	in	Food insecure (N=108)		Food secure (N=42)		Total	
		Number	Percent	Number	Percent	Number	Percent
0		63	77.8	18	22.2	81	54.0
0.5/Half owner ship /		13	86.7	2	13.3	15	10.0
1		32	69.6	14	30.4	46	30.7
2		0	0.0	6	100	6	4.0
3 and above		0	0.0	2	100	2	1.3
Minimum		0		0		0	
Maximum		1		3		3	
Mean		0.36		0.78		0.48	
Std.deviation		0.45		0.86		0.62	
t-value		3.97***					

***Significant at less than 1% probability

Source: Own survey, 2011

3.5 Income The major sources of income include on-farm production, off-farm and non-farm activities. In the study area, transfers in terms of food and other items are also additional sources of income to the farm households. In this section, on-farm and non-farm incomes are discussed in detail.

3.5.1 On-farm income On-farm income includes the value obtained from crop produce and livestock production. The result shows that the average income in both farm categories is about Birr 999.9, with the maximum to be Birr 14000. Table 11 shows that the minimum amount of on-farm income for food secure and insecure group is Birr 100 and Birr 103, respectively; however the maximum amount of on-farm income is about Birr 3500 and 14,100, for food insecure and secure households, respectively. From the total sample, about 39% of farm households have less than Birr 200, of which 90% of them are food insecure (Table 11). T-value indicates that there is significant association between on-farm income and household food security.

Table 10: Annual on-farm income in sample household

Annual on-farm income in Birr	Food insecure(N=108)		Food secure(N=42)		Total	
	Number	Percent	Number	Percent	Number	Percent
> 200	52	89.7	6	10.3	58	38.7
201-2000	50	65.8	26	34.2	76	50.7
2001-4000	6	66.7	3	33.3	9	6.0
4001-6000	0	33.3	4	100	4	2.7
>6000	0		3	100	3	2.0
Minimum	100		103		100	
Maximum	3500		14,000		14,000	
Mean	588.7		2,057.48		999.96	
Std.deviation	716.23		2,802.93		1,722.8	
t-value	5.01***					

***Significant at less than 1% probability

Source: Own survey, 2011

3.5.2 Non-farm income Farmers in the study area are engaged in a variety of off-farm and non-farm activities to support their livelihood. In all sample PA's; there are rural markets which have immediate interactions with Sodo terminal market, which in turn allows ample access to non-farm activities to the surrounding farmers. As the survey result indicates, about 85 respondents (56.7% of the total sample households) reported that they generate income from non-farm activities (appendix II). Non-agricultural and off-farm income often serve as an additional source to buy food items and agricultural inputs, as well as to cover school fees and costs for cloths and for asset building in the study area. As shown in Table 12, the amount of annual non-farm income in sample households varies from Birr 30 to 14,100. The highest amount is recorded in food secure households indicating that this activity is a good source of income to cope with shortage of income and food. The t-value indicates that there is statistically significant difference between the two means at a probability level of 1.

Table 11: Total Non-farm Income of Sample Households

Total income	off-farm	Food insecure (N=108)		Food secured (N=42)		Total(N=150)	
		Number	Percent	Number	Percent	Number	Percent
<100		85	78.0	24	22.0	109	72.7
1001-4000		22	64.7	12	35.3	34	22.7
4001-8000		1	16.7	5	83.3	6	4.0
>8000		0	0.0	1	100	1	0.7
Minimum		30		250		30	
Maximum		4080		8,120		8,120	
Mean		1,031.16		2,826.32		1,547.01	
Std.deviation		1,057.76		2,553.62		1,811.36	
t-value				4.660***			

***significant at less than 1% probability

Source: Own survey, 2011

4.5 Uses of Agricultural Inputs Agricultural inputs are among the most important factors that determine the level of production. Chemical fertilizers and improved seeds, among others, play significant role in increasing productivity and boosting agricultural production. Farmers have ample access to chemical fertilizer with a down payment of 70%. Farmers, however, reported that the price of fertilizer is high and increases year to year. The current price, as reported by the farmers, is two to three times higher than the last five years. Because of this reason, poor farmers are forced to use small amount of fertilizers, which is much lower than the recommended rate. The other important factors for the low utilization of fertilizer include limited cultivated land, low purchasing capacity and fear of inability to repay the credit. Risks associated to agricultural production and its market prices are that other factors that contribute to the low utilization of fertilizer and other inputs. As table 13 shows, about 49% of the total sample households use chemical fertilizer of which 59.5% are food insecure. The chi-square value, which is 11.39, is an evidence for statistically significant association between chemical fertilizer use and level of food security.

Table 12: Utilization of Chemical Fertilizer

Utilization of chemical fertilizer	Food insecure (N=108)		Food secure (N=42)		Total(N=150)	
	Number	Percent	Number	percent	Number	Percent
Yes	44	59.5	30	40.5	74	49.4
No	64	84.2	12	15.8	76	50.6
Total	108	72	42	28	150	100
Chi-square	11.39***					

*** Significant at less than 1% probability

Source: Own survey, 2011

The same situation was observed regarding the use of improved seeds. The main problem, as reported by the farmers, is its unavailability and high cost to acquire it. Farmers do not have adequate access to it, particularly on credit basis, as that of chemical fertilizer. Unavailability of the seed coupled with its high cost constrained farmers to boost crop production and meet food requirements. The Chi-square test indicates that there is statistically significant association between utilization of improved seeds and food security.

Table 13: Uses of improved seed

use improved seed	Food insecure (N=108)		Food secure (N=42)		Total (N=150)	
	Number	Percent	Number	Percent	Number	Percent
yes	35	58.3	25	41.7	60	40
No	73	81.1	17	18.9	90	60
Total	108	72	42	28	150	100
Chi-square value	9.26***					

*** Significant at less than 1% probability

Source: Own survey, 2011

4.6 Food production and its adequacy With the exception of the very small engagement in cash crop production, the study area is more or less limited to production of food crops for subsistence. As show in Figure 4, more than 58% of the respondents grow cereals like Maize, *Teff*, Haricot bean and wheat. About 37% of respondents are growing a variety of root crops such as sweet potato, Irish potato, taro and yam, for household consumption. Only few (2%) households engage in cash crops, particularly in coffee production besides the food crops. Maize and

sweet potato are the widely produced and commonly consumed crops while *Teff* is produced as a cash crop, which is mostly consumed in the towns

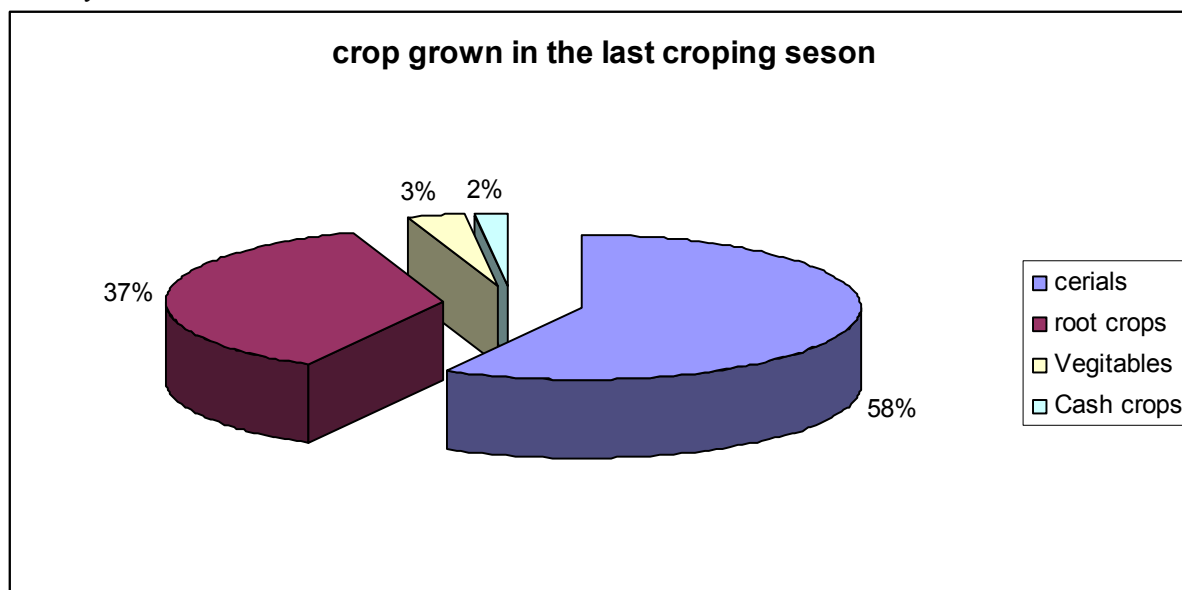


Figure 1: Crops grown during the last cropping years

Source: Own survey, 2011

Even though all of the respondents do engage in crop production of some sort, they don't produce enough for their annual needs. Indeed, the 94.7% of households reported that their agricultural production is not enough to cover their consumption requirements. As shown in Table 15, food insecure households (72% of the total) does not produce enough food to meet the required volume of food throughout the year. From the total sample respondents, only 5% reported that their produce is adequate to last for a year. The rest of the households do not produce enough food to meet the nutritional need their families. During focus group discussion, it was reported small cultivated land size, shortage of plough oxen and rainfall variability is the major problem in the study area. Problems associated to plant disease, poor quality of land, soil erosion, inappropriate use of agricultural input (fertilizer) and shortage of water for use of irrigation system are also reported as serious bottlenecks to food production. The Chi-square statistical test indicates that there is statistically significant association between food security and adequacy of food production.

Table 14: Adequacy of Own Production

Adequacy of food production	Food insecure (N=108)		Food secure (N=42)		Total (N=150)	
	Number	Percent	Number	Percent	Number	Percent
Yes	0	0	8	100	8	5.3
No	108	76.1	34	23.9	142	94.7
Total	108	72.0	42	28.0	150	100
Chi square value	21.7**					

**significant at less than 5% probability

Source: Own survey, 2011

More than 80% of respondents reported that they produce adequate amount of food for own consumption that lasts for four to six months. In other words, farmers do face food shortage for six to eight months in a year and often seek support, particularly in terms of food aid, from government and non-government organizations. Food deficit months in the study area range from January to August. However the severity is very higher from April to August (Figure 5).

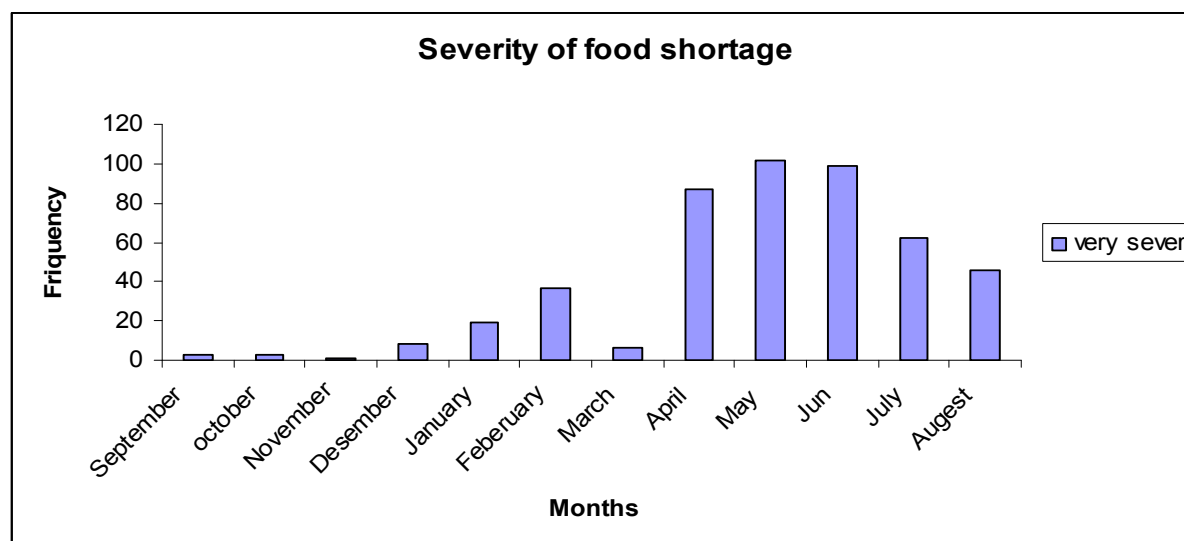


Figure 2: Food shortage in month with their severity

Source: Own survey, 2011

4. 6 Soil Erosion/Sample households perception about soil erosion/ Overgrazing, intensive agricultural practices and soil erosion is the major problem for soil fertility decline in the study area. Personal observation and focus group discussions in all sample peasant associations show that forest resources in the area are currently being deteriorated because of population pressure, illegal wood and metal works, as well as illegal wood trading. As a result, steep slopes have already been cultivated, arable lands are severely exposed to land degradation, and loss of top soil. About 62.7% of the households reported that their land is prone to erosion (Table 16). This problem is highly pronounced in food insecure social groups. The chi-square test indicates that there is statistically significant difference between the two food security groups with respect to the extent of erosion problem.

Table 15: Farm Land Prone to Erosion

Prone to erosion	Food insecure(N=108)		Food secure(N=42)		Total(N=150)	
	Number	Percent	Number	Percent	Number	Percent
Yes	74	78.7	20	21.3	94	62.7
No	34	60.7	22	39.3	56	37.3
Chi-square value	5.64**					

**significant at less than 5% probability

Source: Own survey, 2011

The level of erosion on farm land is distinguished by respondents on three forms (sever, more sever and less sever). From the total respondents about 61% of households reported that their land is exposed to erosion because of its degree of the slope and lack of soil and water conservation measure. As table 17 shows, more than 48% of the respondents reported that their land is severely affected by soil erosion.

Table 16: Level of Erosion Reported by Sample Households

Level of erosion	Frequency	Percent
less sever	47	51.1
sever	31	33.7
more sever	14	15.2
Total	92	100.0

Source: Own survey, 2011

4.8 Rainfall irregularity

Erratic rain fall and its distribution, is the main problematic factor in the region to undertake agricultural operation. It was reported that rainfall irregularities often affect the level of production and its productivity, which in turn affect their livelihoods. USAID (2007) notes that the amount and spatial and temporal distributions of the *belg season* (March-May) rainfall are extremely important and have wider implications for food security in the north eastern and southeastern lowlands of Ethiopia. *Belg rains* are crucial for crop production in the study area. Figure 6 and 7 are presents for several years and seasonal rainfall conditions in the study area respectively. Excess rainfall during harvest time and less rainfall during the planting time are crucial in both cropping seasons (Belg and Meher).

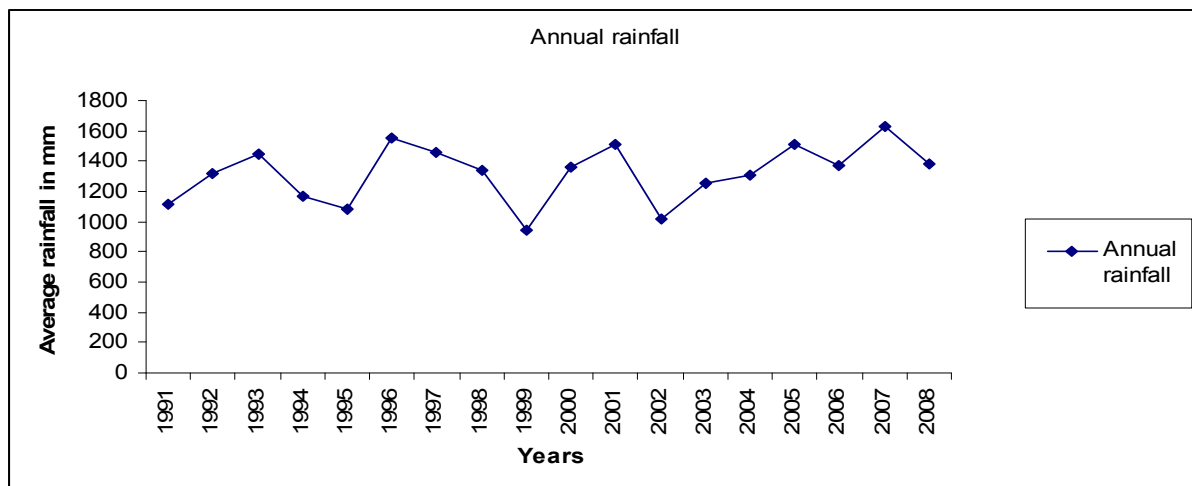


Figure 3: Annual rainfall at Soddo Zuria woreda (1991-2010)
Source: National Metrological Agency Hawassa branch office, 2003

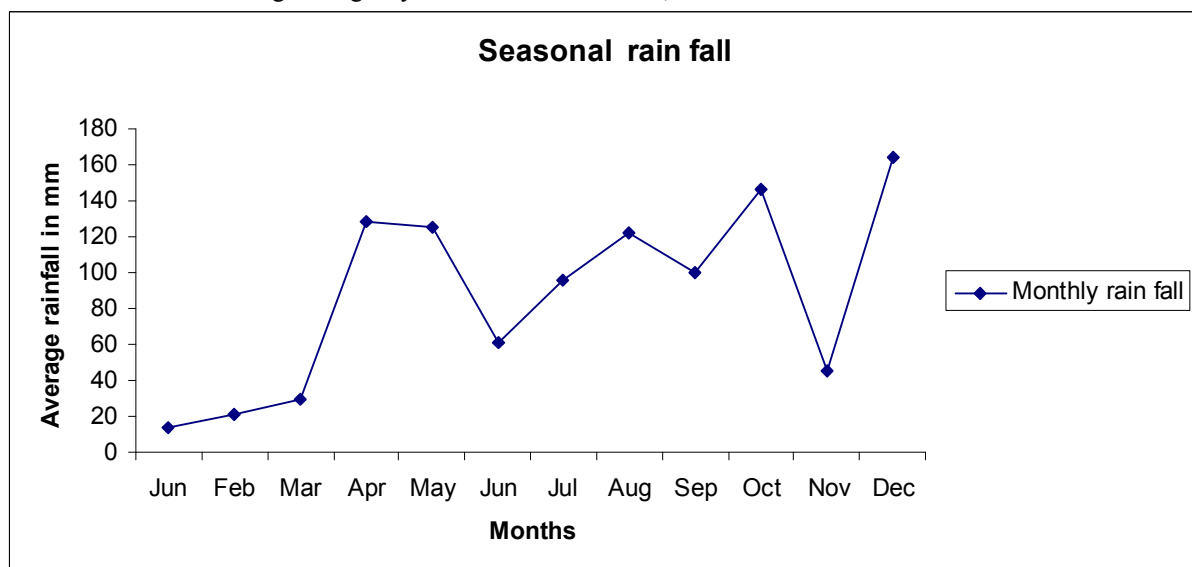


Figure 4: Seasonal rainfall at soddo zuria woreda (1991-2010)
Source: National Metrological Agency Hawassa branch office, 2003

4.9 Social Obligation Social obligations practiced in the study area include Mehabber, wedding, Idir, circumcision, delivery and funeral ceremonies. Most claimed Idir is a very important traditional organization that initiates mutual supports among members. Idir is a social organization which assisted member households during a funeral by providing material and labor support and cash payout to cover the costs. Others, however, lead to resource depletions and aggravate food insecurity among households who often practice them. The table 18 revealed that the yearly expense of food insecure households varies between Birr 50 and Birr 9016 while that of food secure varies between Birr 36 and Birr 2500. The main sources of income for these expenses, as stated by the respondents, include borrowing from local money lenders with high interest rate, borrowing from friends, and selling productive assets such as oxen and cow.

Table 17: Estimated annual expenses for social obligation

Annual expense of social obligation	Estimated	Insecure (N=108)		Secured(N=42)		Total (N=108)	
		Number	Percent	Number	Percent	Number	Percent
< 500		81	74.3	28	25.7	109	72.7
501-2500		24	63.2	14	36.8	38	25.3
2501-4000		1	100	0		1	0.7
>4000		2	100	0		2	1.3
Minimum			50		36		36
Maximum			9016		2500		9016
Mean			497		582		521
Std.deviation			1047		675		956

Source: Own survey, 2011

4.10 Household Coping Strategies

Coping strategy is a mechanism practiced by households to escape from food shortage and crises. At times of food shortage, households always take a range of measures, beginning with less to more severe ones, to cope with the crisis. In the study area, households use different coping strategies depending on harshness of the crisis. The respondents employed different coping strategies to withstand the different levels of food stresses. From the total sample households, only eight households reported that they do not face any food deficit, while the rest /142 households/ reported that they employ a variety of coping mechanisms during food shortage (Table 15). The result revealed that farmers' practices at an initial stage of coping mechanism include reducing size of meals, engaging in daily labor, borrowing cash from relatives and friends and selling firewood and charcoal. Engaging in daily labor is widely practiced in the study area in particular and in the zone in general.

Table 18: Response of coping strategies during initial food shortage

No	Coping strategy at initial stage	Food insecure	Food secure	Total
1	Sale of live stock	1	0	1
2	Borrowing grains or cash from relatives or neighbors	127	4	131
3	Reducing number of meals	25	2	26
4	Reducing size of meal	138	4	142
5	Sale of fire wood and charcoal	122	11	136
6	Participating in daily laborer	136	6	142
7	Receiving food aid	1	2	3
8	Sale of farm and household equipments	2	1	3

Source: Own survey, 2011

Coping mechanisms practiced at sever stage also include reducing number of meals as their first option and selling of livestock and agricultural and household equipment as well as engaging in begging. Households often migrate to other places and, in most cases part of family members are migrated to nearby towns (Soddo town) and as far as Weyito, Abaya and Addis Ababa. In times of food shortages, the men migrate to nearby towns in search of jobs, engage in temporary work on farmlands of 'well-off' farmers or migrate to state owned farms out of the *Woreda*. Women, on the other hand, work for better farm households in *enset* processing and other household chores mainly in exchange of payments in kind. Even children, beyond quitting schooling, get employed as herders for 'rich' families at time of sever situation. When we compare the two stages of coping mechanisms, (table, 19 and 20); sample household uses coping mechanisms at sever stages are higher in number than those who use initial stage. On other side, most of the coping strategies are exercised by food insecure household rather than by food secure household.

Table 19: Response of coping strategies during severe food shortage

No	Coping strategy at severe stage	Food insecure	Food secure	Total
1	Sale of live stock	85	11	96
2	Borrowing grains or cash from relatives or neighbors	61	24	85
3	Reducing number of meals	120	22	142
4	Reducing size of meal	3	2	5
5	Sell of fire wood and charcoal	5	2	7
6	Participating in daily laborer	7	3	10
7	Receiving food aid	45	11	56
8	Sale of farm and household equipments	80	9	89
9	Seasonal migration	36	5	41
10	Withdrawing children from school	60	5	71
11	Begging	50	7	57
12	Skippping wedding and other ceremonies	76	3	79
13	Renting own land	12	4	16

Source: Own survey, 2011

5. CONCLUSION AND RECOMMENDATIONS

Conclusion

The study population is more youthful in that most of the respondents below the ages 45. The majority of the respondents were male (67.3%) and the rest (32.7%) were female headed households. With regards to education, more than 51.3% of household heads could not read and write while significant number of household heads attained primary school levels. The study area is chronically food insecure; and it was found that 72% of the total households were affected by food insecurity. These households could not cover the required minimum daily calorie from the income generated from their major farming activities which are dominated by of subsistence agriculture. Food shortage in the area is common and occurs every year. Crop production alone has not brought significant changes over attaining food security at household level. Particularly, food crop production falls far short of consumption requirements of the people. It was reported that own production lasts from four to six months covering consumption requirement of farm households. It is highly constrained by many problems including limited farm land holding, shortage of plough oxen, soil degradation, rainfall variability, poor quality of land, and soil erosion. Critical shortage of arable land forced farm community to cultivate sloppy areas that in turn aggravated soil erosion. The high growth of population, on the other hand, has also contributed for diminishing of cultivated land in the study area. Land holding continually decreased both in size and quality due to frequent redistribution among family members and continuous cultivation this in turn leads to soil nutrient depletions and erosion. Average per capita land holding has steadily reduced and remained meager source of food. Livestock production, on the other hand, has also constrained by lack of grazing land and feed, as well as by the prevalence of animal diseases. Lack of oxen power has also remained one of the critical problems in the process of utilization of land and labor power. Moreover, uses of chemical fertilizers and other yield augmenting inputs are limited due to low purchasing power and fear of inability to repay credit. Risks associated to agricultural production and its market prices are the other factors that contribute to the low utilization of modern inputs. In times of food shortages, the men migrate to nearby towns in search of jobs, engage in temporary work on farmlands of 'well-off' farmers or migrate to state owned farms out of the *Woreda*. Women, on the other hand, work for better farm households in *enset* /false banana/t processing and other household chores mainly in exchange of payments in kind. Even children, beyond quitting schooling, get employed as herders for 'rich' families at time of sever situation.

Recommendations

Based on the findings discussed above, the following recommendations are very crucial to enhance improved food security at household level. The possible areas of intervention include:

- Land is a critically scarce resource which influences the state of rural food security in the region. Agricultural sector should promote biophysical conservation activities (proper land use system, soil and water conservation) are essential to maintain the productivity of arable land and improve the fertility of soils
- Oxen ownership is very important and critical factors for agricultural production in the study area. It allows effective utilization of land and labor power. In this regard, proper interventions towards improving oxen ownership through Credit Associations and animal health services are important through extension services.
- Size of household members has significant association with the state of household food security. The

intensity of food insecurity is increased as the number of dependent members is increased. This situation calls for family planning that should be implemented through awareness creation and provision of education to both rural men and women.

- Non-farm incomes are among the major socio economic variables that affect household food security. Micro and small scale enterprise should facilitate Promoting and expanding non-farm activities especially for those who have little or no land for cultivation
- Use of Agricultural inputs (chemical fertilizer and improved seed) was found to be one of determining factors to household food security. Development Agents should be strengthened and expanded to initiate farmers to use inputs and increase agricultural production. And also agricultural sectors attention must be given in facilitating timely supply of chemical fertilizers and improved seeds.
- Rainfall variability is the major problem in the region and directly related to household food security. Researches should be geared towards short season and moisture tolerant crops that could withstand the variability of rainfall.
- Food shortage in the study are often occurs between January and August with a severe shortage in the months April and August. Thus, these months need special interventions by both government and non-governmental organizations to withstand the occurrence of food stress among households.
- In the study areas sell of livestock and household equipments used as severe stage coping mechanisms. The government intervention should be important at the initial stages to protect household assets and destitution.

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